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Better Understanding of Minimizing Infectious Complications After Transrectal Prostate Biopsy

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The case-control study by Carignan and colleagues helps improve our understanding of risk factors for infection complications after prostate biopsy [1]. The authors noted a significantly increased incidence of infection complications after prostate biopsy, from 0.52 infection per 100 biopsies in 2002–2009 to 2.15 infections per 100 biopsies in 2010–2011. These findings fall in line with trends noted recently by other groups [2,3]. For instance, Loeb et al. reported that risk of infection complications requiring hospitalization was significantly greater in more recent years, when evaluating a 5% random sample of Medicare participants in the United States [2].

In the present study, Carignan and coworkers retrospectively reviewed the charts of 5798 men undergoing transrectal prostate biopsy between 2002 and 2011. From this cohort, the investigators identified 48 men who developed urinary sepsis after biopsy. These 48 patients were randomly matched to 192 control patients who underwent prostate biopsy without infectious complications. Using this approach, the authors identified, on multivariate analysis, diabetes mellitus, hospitalization in the month before biopsy, chronic obstructive pulmonary disease, and later calendar year of biopsy as risk factors for postbiopsy infection [1]. The authors found that *Escherichia coli* was the most common pathogen (75% of cases) and the cultured pathogen was resistant to ciprofloxacin in 52% of cases. The study follows other reports that, collectively, have identified later calendar year of biopsy, nonwhite race, higher comorbidity scores, enlarged prostate, recent international travel, and recent antibiotic use as risk factors for postbiopsy infection [1–5].

The increasingly common problem of postbiopsy infection is particularly vexing since transrectal ultrasound-guided prostate biopsy is a common office procedure (at least 1 million biopsies per year) and remains the gold standard for the diagnosis of prostate cancer [2]. In the current era of prostate cancer screening, transrectal prostate biopsy is frequently performed in accordance with clinical guidelines designed to optimize utilization and minimize biopsy risk. For years, the approach with prophylactic antibiotics and bowel-cleansing regimens has been a cornerstone of the clinical guidelines to specifically minimize complications from infection. In this regard, fluoroquinolones have been the preferred antibiotic, given the favorable antimicrobial spectrum and high prostatic concentration. Unfortunately, bacterial resistance to fluoroquinolones and other antibiotics has been implicated in the increased incidence of complications from infection after prostate biopsy [6]. While the risk for the individual patient is still low, the aggressive nature of the presenting infections and the overall population-based implications following biopsy are significant [6].

The big question now is, how should we move forward? The authors of the current article suggest that novel antibacterial prophylaxis approaches need to be evaluated [1]. They state that a knee-jerk approach to using prophylactic fluoroquinolones must be reexamined. In this regard, some investigators have studied a *carpet bombing* approach with broader spectrum antibiotics and have shown favorable results. Using a prospective randomized evaluation of antibiotic regimens including piperacillin/tazobactam alone, piperacillin/tazobactam with a fluoroquinolone, or a fluoroquinolone alone, Shigemura and coworkers reported postbiopsy infection rates of 3.7%, 0%, and 5%, respectively [7]. From a decision-tree cost analysis, Adibi and colleagues also found that as the risk of hospital admission secondary to postbiopsy infection increases, the use of a broader-spectrum

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antibiotic regimen becomes more cost effective than the standard prophylactic antibiotics [8]. Alternatively, other groups have shown promise with targeted antibiotic prophylaxis [5,9]. This *smart bomb* approach is overall efficacious and recently has been reported as cost effective compared to standard empirical prophylaxis with ciprofloxacin [9]. A downside to targeted therapy, however, is that systems and procedures related to prostate biopsy are more cumbersome and drawn out as patients await the results of rectal swabs and delivery of individualized antibiotics before prostate biopsy.

A patient-centered, risk-stratified approach to limiting infection complications may be the best answer. Indeed, the best decisions on overall risk reduction may be decided during the initial urologic consultation. First, appropriate patient selection may help reduce infection risk. Since postbiopsy infection rates seem higher with older and potentially more debilitated patients, a more conservative decision about proceeding with biopsy may make sense with these patients, not only on the basis of infection risk but also from the standpoint of overall survival threat [2]. For patients deemed suitable candidates, empowering patients in the decision making regarding optimal prophylaxis seems prudent. In this regard, patients concerned about infection or those with a significant number of risk factors could be offered more expanded empiric prophylaxis or targeted prophylaxis following rectal swabs. For younger patients without risk factors for postbiopsy infection and for those patients otherwise accepting the potential risks of postbiopsy infection, the standard approach with fluoroquinolone prophylaxis could be used. This tailored approach would give urologists the most clinically relevant information on patients at higher infection risk yet keep the patient preparation systems simplified for patients with lower risk of infection.

Lastly, the whole issue of postbiopsy infections fundamentally has to do with the fact that prostate cancer is largely diagnosed via transrectal needle biopsy. Given the recent spike in infection complications after prostate biopsy, the ideal method to diagnose prostate cancer must be pondered. The problem really begs the question of whether we could do better with prostate cancer diagnostics. Despite local anesthetics, the whole procedure is barbaric, and it is surprising that the issue of infection has not come to light years ago. Is it absolutely required that a tissue diagnosis be made in all cases? Alternatively, can other technologies and adjunctive tests be further developed to minimize unnecessary biopsies and reliably diagnose disease without the morbidity of biopsy? For instance, Cornu and associates recently evaluated volatile organic compounds in urine as a prostate cancer biomarker. When compared to prostate biopsy, analysis of volatile organic compounds could identify cancer in 30 of 33 cases [10]. Furthermore, as advances continue with magnetic resonance and other imaging modalities, the potential for diagnosing prostate cancer on the basis of imaging signatures alone becomes more realistic. In summary, the current study by Carignan and colleagues is an important step forward because it builds on our knowledge of risk factors for postbiopsy infection. The hope, however, is that knowledge learned from this type of analysis not only will permit us to biopsy our patients more safely but also will serve as a catalyst to rethink safer and potentially less invasive or even noninvasive prostate cancer diagnostics in the 21st century.

Conflicts of interest: The author has nothing to disclose.

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